

# Surgical Outcomes of Bilateral Technique of Septal Extension Graft in Septorhinoplasty: A Single-center Experience

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**Background:** Several studies have explored the use of septal extension grafts (SEGs). However, there is a lack of research specifically addressing the bilateral application of this technique. The present retrospective study presented the surgical outcomes of the bilateral SEG at a single center in Saudi Arabia.

**Methods:** The present study was a retrospective cohort study that retrieved data from adult patients who underwent septorhinoplasty with the bilateral SEG technique between January 2015 and December 2022 at a single center in Saudi Arabia. The retrieved data included the Rhinoplasty Outcome Evaluation (ROE) scores and Nasal Obstruction Symptom Evaluation scores.

**Results:** The study included 58 patients with a mean age of  $30.8 \pm 7.4$  years. The most frequent intraoperative findings were deviated nasal septum (62.1%), nasal hump (58.6%), and down rotation (62.1%). The ROE questionnaire results showed statistically significant improvements in all constituents ( $P < 0.0001$ ) after surgery. The mean total ROE score improved from  $9.3 \pm 3.5$  preoperatively to  $18.7 \pm 4.4$  postoperatively ( $P < 0.001$ ). Similarly, the mean total Nasal Obstruction Symptom Evaluation score improved from  $6.6 \pm 6.4$  preoperatively to  $2.1 \pm 3.6$  postoperatively ( $P < 0.001$ ). None of the patients had dorsal or tip deviations. We observed tip stiffness in 8 (13.8%) patients.

**Conclusions:** Bilateral SEG in septorhinoplasty has demonstrated promising results in improving both functional and aesthetic outcomes. The results of this retrospective study showed high patient satisfaction rates and a low incidence of postoperative complications. (*Plast Reconstr Surg Glob Open* 2025;13:e6780; doi: 10.1097/GOX.0000000000006780; Published online 2 May 2025.)

## INTRODUCTION

Septorhinoplasty is one of the most commonly performed procedures worldwide due to its proven effectiveness in addressing functional and cosmetic concerns and improving patients' overall quality of life.<sup>1,2</sup> However, the stability of nasal tip projection represents a significant challenge to functional restoration and aesthetic refinement.<sup>3,4</sup>

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Several reports showed that alterations in nasal tip projection can result in aesthetic imbalances, nasal asymmetry, and dissatisfaction with nasal appearance.<sup>5</sup> As a result, surgeons typically aim to maintain nasal tip projection and contour while avoiding excessive upward rotation of the nose to optimize functional and aesthetic outcomes. In the past few decades, surgeons have used several techniques to correct the septal deviation and nasal tip projection in septorhinoplasty. Since their description by Byrd et al,<sup>6</sup> surgeons have widely utilized septal extension grafts (SEGs) to stabilize the nasal tip projection, rotation, nasal length, and shape.<sup>7</sup> The technique entails placing cartilage grafts along the dorsal and/or caudal aspects of the nasal septum to augment nasal tip projection, stabilize the nasal dorsum, and address septal deviation simultaneously.<sup>8</sup> Previous reports showed that SEG provided better

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tip support and preservation of rotation compared with the more conventional columellar strut grafts.<sup>9</sup>

The principle behind the SEG involves creating structural support by utilizing septal cartilage to reinforce the nasal framework. This is achieved by securing the SEG at a specific angle and extending it toward the interdomal space, where it provides support and defines the nasal tip. The distal part of the graft is shaped to create a natural supratip break, enhancing the aesthetic appearance of the nose. This shaping involves securing the graft at 3 points along the lower lateral cartilage (LLC) and adjusting the tip position for optimal results.<sup>6</sup> Different techniques exist for implementing SEGs, tailored to the specific needs of each patient, including unilateral, bilateral, and caudal septal advancement techniques.<sup>7</sup> Several factors influence the outcomes of septorhinoplasty utilizing the SEG technique, including the strength of the L-strut, the shape and size of the harvested septum, the degree of deviation in the L-strut, and the method of fixation of the SEG.<sup>10</sup>

Several studies have explored the use of unilateral SEGs and their associated surgical outcomes, advantages, disadvantages, and complications.<sup>10–12</sup> However, there remains a notable lack of research specifically addressing the bilateral application of this technique. This gap arises from concerns surrounding the potential impact of bilateral SEGs on various aesthetic aspects of rhinoplasty, including nasal tip definition, columellar width, and overall nasal stability. Additionally, evidence is scarce regarding the long-term durability and aesthetic outcomes of bilateral SEGs compared with unilateral or traditional grafting methods. The present retrospective study presented the surgical outcomes of the bilateral SEG at a single center in Saudi Arabia.

## METHODS

The study protocol was approved by the institutional review board (IRB) of the King Saud University, Saudi Arabia (reference no. 23/0312/IRB). Given the retrospective nature of the study, the requirement for informed consent was waived by the IRB committee.

### Study Design and Data Source

The present study was a retrospective cohort study that retrieved data of adult patients who underwent septorhinoplasty with the SEG technique between January 2015 and December 2022 at King Abdulaziz University Hospital in Riyadh, Saudi Arabia. We retrieved the medical records of all adult patients who underwent open septorhinoplasty using the bilateral SEG technique. We excluded cases with revision septorhinoplasty; patients who underwent other sinonasal procedures, including previous septoplasty; patients with congenital nasal deformities; patients diagnosed with granulomatous and inflammatory diseases affecting septal cartilage; and/or patients with diabetes and hypertension.

### Surgical Technique

Surgery was carried out under general anesthesia using an open rhinoplasty approach. Infiltration of local

## Takeaways

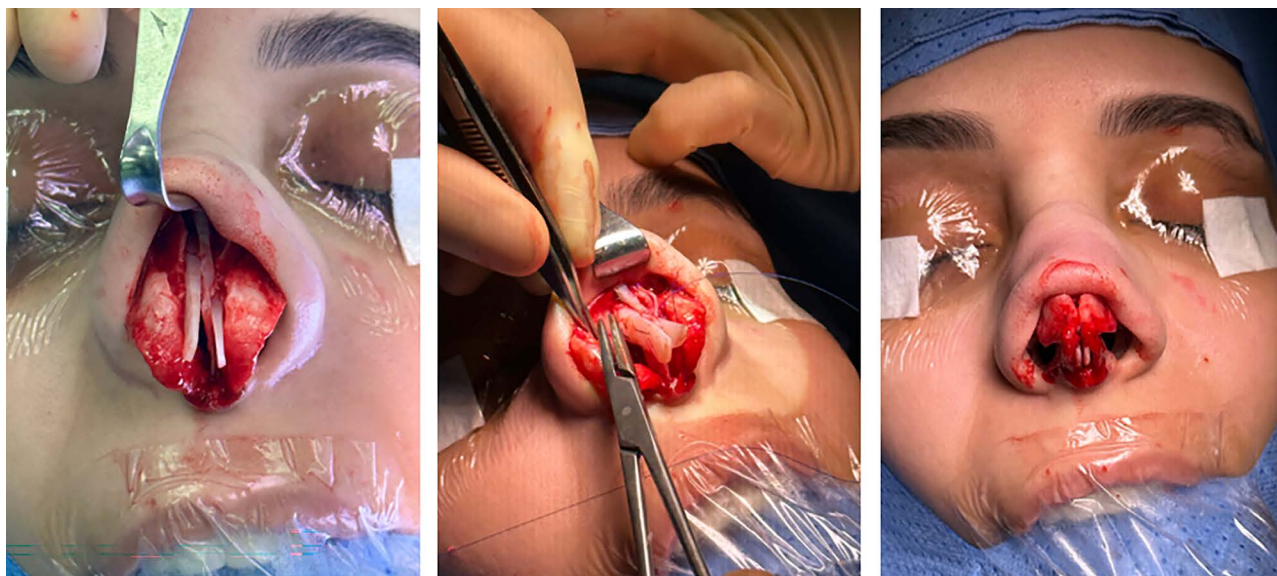
**Question:** What are the outcomes of the bilateral technique of septal extension graft in septorhinoplasty?

**Findings:** This retrospective cohort study included the following: the Rhinoplasty Outcome Evaluation questionnaire results showed statistically significant improvements in all constituents ( $P < 0.0001$ ) after surgery. The Nasal Obstruction Symptom Evaluation score improved significantly postoperatively ( $P < 0.001$ ).

**Meaning:** Bilateral septal extension graft in septorhinoplasty has demonstrated promising results in improving both functional and aesthetic outcomes in terms of high patient satisfaction rates and a low incidence of surgical complications.

anesthesia with 1% lidocaine in 1:200,000 epinephrine was used, with a total quantity ranging from 10 to 15 mL. The injection was applied in the nasal dorsum, sidewalls, tip, columella, caudal margin of LLC, and septum. An inverted V transcolumellar incision was made in the narrowest part of the columella and connected with a bilateral marginal incision at the caudal margin of the LLC. The Pitanguy ligament was transected. The flap dissection was carried out in the supra-perichondrial plane and then subperiosteal until the nasal bones were reached. At the site of the anterior septal angle, septoplasty started. Separation of connective tissue between the medial crura was done to reach the caudal end of the septum. Mucoperichondrial and mucoperiosteal flap elevation was achieved. The roof was then opened bilaterally through cutting of the upper lateral cartilage dorsally and bilaterally to expose the septum and prepare to place an SEG. Before septal cartilage harvesting and septoplasty were made, if needed for other reconstruction, the hump was addressed. Then, septal cartilage was harvested, leaving an adequate L-strut to maintain nasal support. If the septal cartilage was insufficient, conchal cartilage was harvested from the ear through a retroauricular incision and shaped to match the thickness of the septal cartilage. The average dimensions of the SEGs were 2 cm in length and 0.8 cm in height, with a rectangular shape and rounded end. The SEG was positioned on either side of the septum, extending to the interdomal space between the medial crura of the LLCs, and angled according to the desired tip projection and rotation. The extension from the caudal end of the septum was about 5 mm to 1 cm. Both strips of cartilage were then secured in place using nonabsorbable sutures, such as Prolen 4-0 or 5-0 suture (Fig. 1); the gap between the 2 SEGs was anteriorly filled with strips of cartilage. (See Video 1 [online], which displays the placement and securing of bilateral SEGs.) (See Video 2 [online], which displays the anterior gap filling of cartilage strips between bilateral SEGs.)

The roof of the nose was approximated and closed using absorbable suture 4-0 or 5-0 polydioxanone sutures. The nasal tip was refined using suture techniques. Other steps were then done accordingly, including cephalic timing, domal suture, and supratip augmentation as needed



**Fig. 1.** Intraoperative configuration of bilateral SEG.

per case, and the incisions were closed in layers using absorbable sutures. Transcolumellar incision closure was performed using a 6-0 nylon suture; marginal and transseptal closures were performed using 5-0 Vicryl Rapide sutures. Internal nasal splints were placed bilaterally and were secured using 2-0 silk sutures. An external nasal splint was placed over the nasal dorsum. Postoperative care included the use of saline nasal irrigation, antibiotics, and analgesics as needed. The internal nasal splints and external splints were removed 7 days after the surgery in the clinic.

### DATA COLLECTION

The following data were extracted from the medical records of eligible patients: demographic information, preoperative assessment, surgical details, postoperative outcomes, Rhinoplasty Outcome Evaluation (ROE) scores, and Nasal Obstruction Symptom Evaluation (NOSE) scores. The ROE questionnaire is a 6-item survey designed to measure patient satisfaction with the aesthetic and functional outcomes of rhinoplasty surgery. Each item is rated on a 5-point Likert scale ranging from 0 (worst) to 4 (best), with a total score ranging from 0 to 24. The ROE questionnaire has been shown to have good internal consistency, test-retest reliability, and construct validity.<sup>13</sup> On the other hand, the NOSE scale is a 5-item survey designed to assess the severity of nasal obstruction symptoms in patients undergoing rhinoplasty surgery. Each item is rated on a 5-point Likert scale ranging from 0 (not a problem) to 4 (severe problem), with a total score ranging from 0 to 20. The NOSE scale has been shown to have good internal consistency, test-retest reliability, and construct validity.<sup>14</sup>

### STATISTICAL ANALYSIS

Data were exported onto a dedicated data collection sheet in Microsoft Excel and appropriately coded for analysis in SPSS (Version 25, IBM, NY). Categorical data were presented as frequencies and percentages, whereas

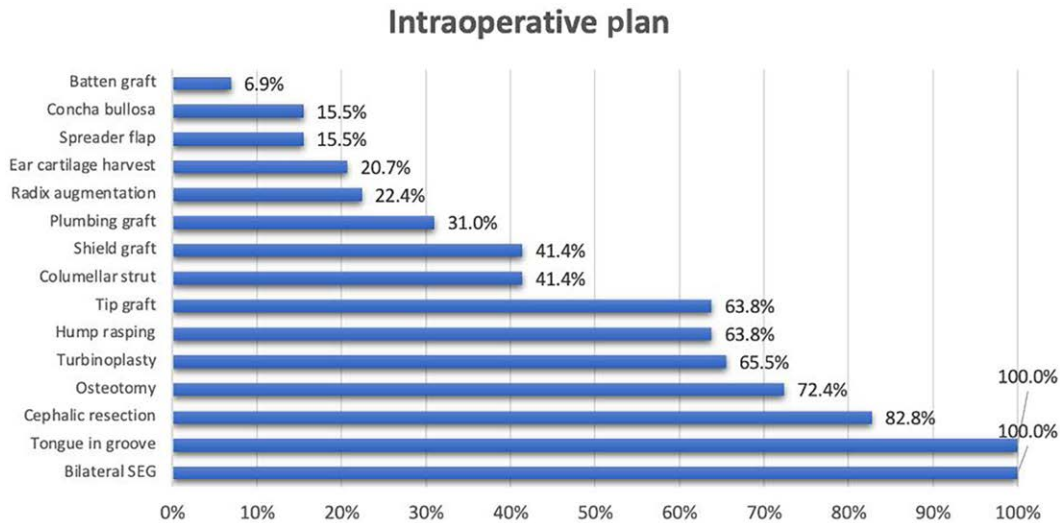
continuous data were presented using mean values with SD (after checking the normalcy of data using histograms wherever appropriate). Testing for statistically significant differences between categorical variables was done using the chi-square test, and the independent samples *t* test was used in the case of continuous variables. A *P* value of less than 0.05 was regarded as being statistically significant.

### RESULTS

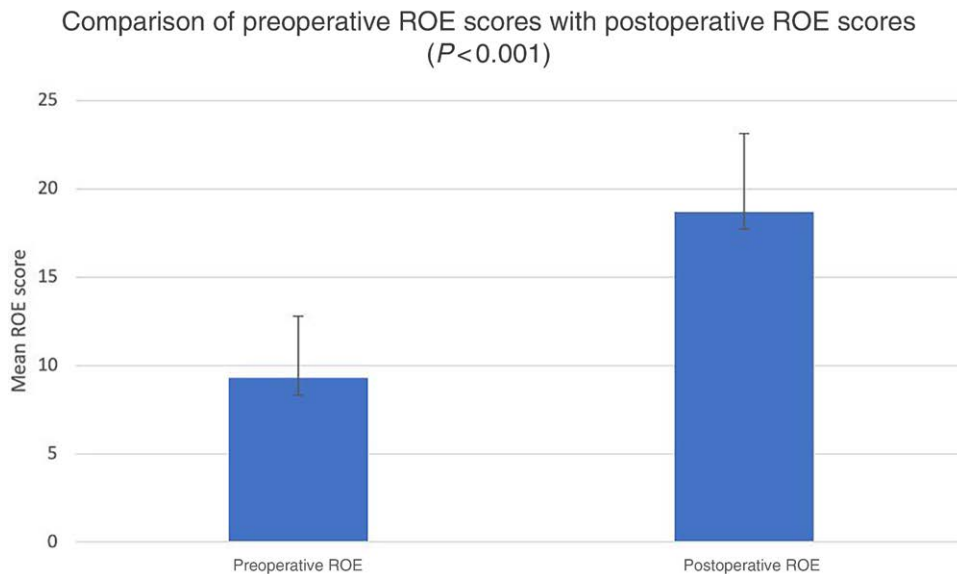
The study included 58 patients who underwent open septorhinoplasty using the bilateral SEG technique. The mean age of the patients was  $30.8 \pm 7.4$  years, and the majority were women (93.1%). Regarding marital status, most patients were single (63.8%), followed by divorced (34.5%) and widowed (1.7%). The mean time since surgery was  $5.2 \pm 2.6$  months. In terms of the indication for surgery, 62.1% of patients underwent surgery for functional reasons, whereas 37.9% underwent surgery for aesthetic reasons. A total of 20.7% of patients had a previous surgery, and 15.5% had a previous trauma. None of the patients had a history of filler injections, diabetes mellitus, hypertension, drinking, medication use, connective tissue disease, or other diseases. However, 8.6% of patients were smokers. (See table, Supplemental Digital Content 1, which displays the demographics and clinical characteristics of the patients, <http://links.lww.com/PRSGO/E45>.)

With regard to intraoperative findings, the most frequent intraoperative findings were thick skin (31.0%), deviated nasal septum (62.1%), high intercrrural tension (34.5%), nasal hump (58.6%), flaring of alae (43.1%), bulbous tip (53.4%), under projection (39.7%), and down rotation (62.1%). On the other hand, the most frequent intraoperative plans were bilateral SEG (100%), tongue in groove (100%), cephalic resection (82.8%), tip graft (63.8%), osteotomy (72.4%), and turbinoplasty (65.5%). Additionally, columellar strut (41.4%) and shield graft (41.4%) were also commonly performed (Fig. 2).





**Fig. 2.** Distribution of intraoperative plans.

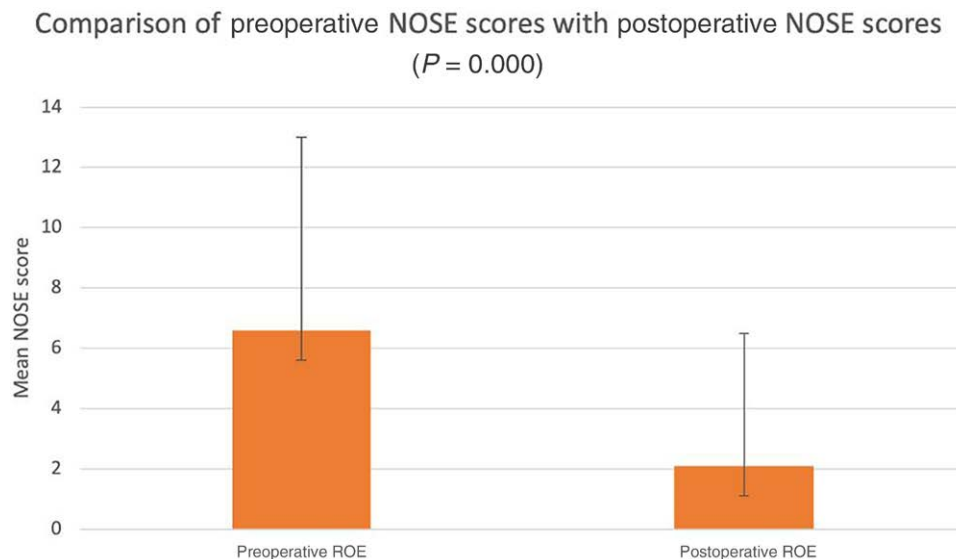


**Fig. 3.** Comparison of mean ROE scores (preoperative versus postoperative).

The results of the study demonstrated significant improvements in both the ROE and NOSE scores following the bilateral SEG in septorhinoplasty. The ROE questionnaire results showed statistically significant improvements in all constituents ( $P < 0.0001$ ) after surgery. The mean total ROE score improved from  $9.3 \pm 3.5$  preoperatively to  $18.7 \pm 4.4$  postoperatively ( $P < 0.001$ ) (Fig. 3). The most frequent findings in the ROE scores were that patients reported a significant improvement in the appearance of their nose, with 62.1% of patients reporting that they liked their nose “very much” or “completely” following surgery, compared with only 10.3% before surgery. Additionally, patients reported significant improvements in their ability to breathe through their nose, with 51.7% reporting that they could breathe “completely” following surgery, compared with only 19.0%

before surgery. Patients also reported significant improvements in their confidence in their nasal appearance and their ability to engage in social and professional activities without feeling limited by their nasal appearance. (See table, Supplemental Digital Content 2, which displays the comparison of ROE scores and constituents, <http://links.lww.com/PRSGO/E46>.)

Similarly, the NOSE questionnaire results showed statistically significant improvements in nasal blockage or obstruction ( $P = 0.008$ ), trouble breathing through the nose ( $P < 0.0001$ ), trouble sleeping ( $P < 0.0001$ ), and inability to get enough air through the nose during exercise or exertion ( $P = 0.003$ ) after surgery. However, there was no statistically significant improvement in nasal stuffiness ( $P = 0.079$ ). The mean total NOSE score improved from  $6.6 \pm 6.4$  preoperatively to  $2.1 \pm 3.6$  postoperatively



**Fig. 4.** Comparison of mean NOSE scores (preoperative versus postoperative).

( $P < 0.001$ ). Overall, the results suggest that the novel bilateral SEG technique used in septorhinoplasty significantly improves both the aesthetic and functional outcomes of the nose ( $P < 0.001$ ; Fig. 4). (See table, **Supplemental Digital Content 3**, which displays the comparison of NOSE scores and constituents, <http://links.lww.com/PRSGO/E47>.) The aesthetic postoperative result is shown in Figure 5.

None of the patients had dorsal deviation or tip deviation. Tip stiffness was observed in 8 (13.8%) patients. No patients had graft visibility, and all patients had graft stability. All patients (100%) achieved the expected outcome, and all patients (100%) had good intranasal valve function. Patient satisfaction was high, with 56 (96.6%) patients reporting satisfaction with the surgical outcome. None of the patients had basal asymmetry. (See table, **Supplemental Digital Content 4**, which displays the postoperative outcomes, <http://links.lww.com/PRSGO/E48>.)

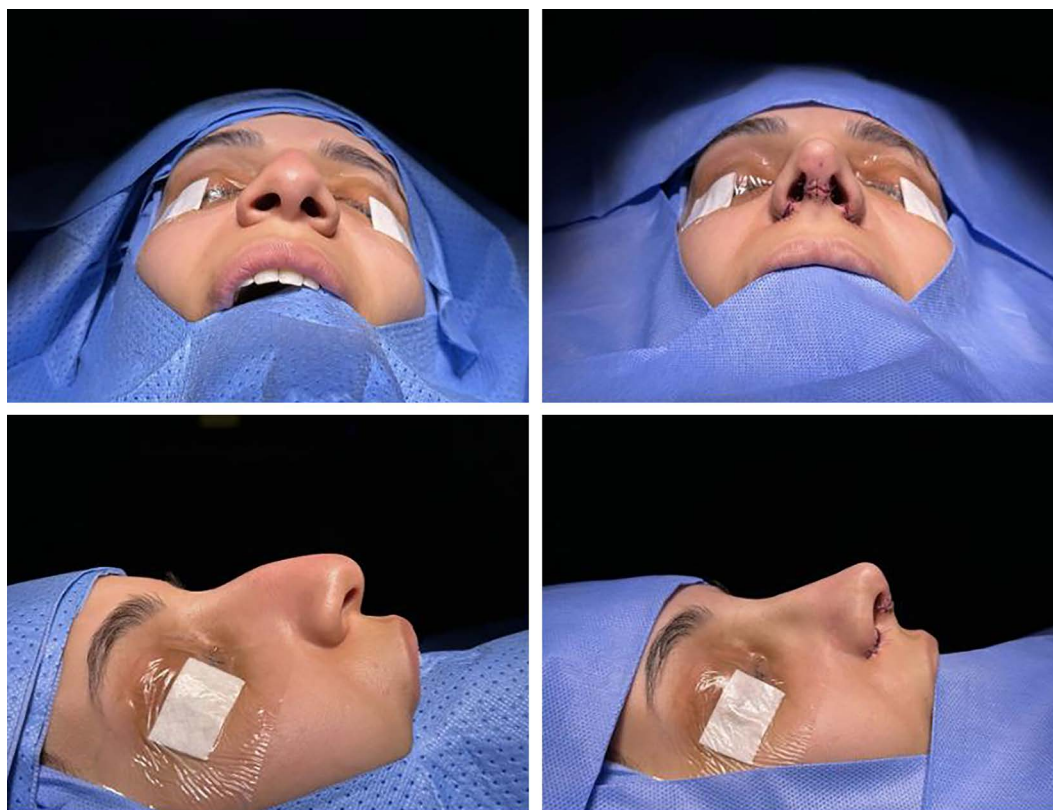
## DISCUSSION

Nasal tip correction is a crucial aspect of rhinoplasty, but it can be challenging due to the weak and complex support structures of the nasal tip and the potential for changes in shape caused by disruption of accompanying nasal attachments.<sup>15</sup> Various surgical methods have been developed to provide strong support for nasal tip elevation. The caudal septum extension graft is a widely used technique in rhinoplasty, first described by Byrd et al<sup>6</sup> to control the tip position and shape. The use of the SEG can reduce unnecessary overresection of the nasal dorsum and provide an aesthetically pleasing nasal projection without any dorsal modification.<sup>15,16</sup>

However, the unilateral use of SEG may result in lateralization of the nasal tip, and optimal results may need intraoperative trials of the graft piece and side placement.<sup>17</sup> Bilateral SEGs can mitigate the long and frustrating carving process and provide a long-lasting, stable

columellar strut. Thus, we evaluated our center's experience with bilateral SEG to evaluate its postoperative outcomes and the impact on patient satisfaction. There are no specific indications for bilateral SEG; we use bilateral SEG in the straight axis nose to prevent withdrawals of unilateral SEG, such as axis deviation and asymmetrical columella. The ROE and NOSE scores are widely used questionnaires to assess patient satisfaction and quality of life after rhinoplasty. This study showed significant improvements in both ROE and NOSE scores after the novel bilateral technique of SEG in septorhinoplasty. The improvement in ROE scores indicates that patients were highly satisfied with the appearance of their noses after surgery, with significant improvements in all constituent questions. This suggests that the bilateral technique of SEG was effective in improving the aesthetic outcome of the surgery. Similarly, the improvement in NOSE scores indicates that patients experienced significant improvements in their nasal function after surgery, particularly in nasal blockage or obstruction, trouble breathing through the nose, and trouble sleeping. All patients (100%) achieved the expected outcome, and all patients (100%) had good intranasal valve function. Patient satisfaction was high, with 56 (96.6%) patients reporting satisfaction with the surgical outcome. These findings suggest that the bilateral technique of SEG improved not only the aesthetic outcome but also the functional outcome of the surgery.

These findings align with the previous report by Kang and Ryu,<sup>18</sup> which showed that bilateral SEG up to the interdomal space led to satisfactory tip definition. In this study, all patients reported significant improvements in the nasal tip shape and stable tip support.<sup>18</sup> A similar outcome of the bilateral approach was demonstrated using the caudally extended bilateral spreader grafts, in which patients were found to have adequate postoperative nasal length and well-proportioned facial features.<sup>15</sup> Likewise, bilateral fan-shaped SEG was associated with patient-reported improvement in the nasal tip shape and a high satisfaction



**Fig. 5.** Comparison of preoperative and postoperative outcomes using bilateral SEG.

rate.<sup>17</sup> The results of bilateral SEG, as demonstrated by the present study, are also comparable to previous studies evaluating unilateral SEG and showing satisfactory nasal tip lengthening and projection.<sup>8,11,19</sup> This was also demonstrated in previous comparative studies, which showed that unilateral or asymmetrical bilateral SEGs had comparable nasal tip projection and aesthetic outcomes.<sup>16</sup>

SEGs are not without potential complications. One of the most common complications is stiffness of the nasal tip, which can occur due to excessively large or thick grafts or scarring and fibrosis around the graft. Another potential complication is the deviation of the nasal tip, which can occur if the graft is not placed symmetrically or if it becomes displaced postoperatively. Infection is a rare but serious complication of SEGs.<sup>19,20</sup> In the present study, tip stiffness was observed in 8 (13.8%) patients. No patients had graft visibility, and all patients had graft stability. None of the patients had basal symmetry. Such data confirm that bilateral SEG is a safe procedure for nasal tip projection and is associated with favorable postoperative outcomes. In a previous study, the most common complications associated with SEGs were nasal tip stiffness (45.5%) and a decrease in projection (45.5%). Stiffness is a known undesirable side effect of SEGs in general; however, it is neglected by the majority of patients. After 6 months of surgery for bilateral SEGs, we observe a slight but not significant improvement in stiffness. However, most patients find this stiffness unproblematic as long as they achieve the desired cosmetic outcome. The only measure we used to reduce stiffness was by using a soft tissue cap graft, such

as a cephalic-trimmed part or any other soft tissue, which can help to decrease the feeling of stiffness if the patient uses his or her finger to palpate the tip. Nasal tip deviation was observed in 11.4% of patients, with 1 patient requiring revision surgery.<sup>19</sup> When we approximate the bilateral nasal bones medially, bilateral SEG and lateral osteotomy enhance the aesthetic contour of the nasal dorsum. This technique maintains the lateral wall from the nasal bone to the upper lateral cartilage on the same plane, thereby preventing any sidewall depression that may occur during rhinoplasty without SEG or spreader graft.

To our knowledge, few studies have evaluated the postoperative outcomes of bilateral SEG. However, the current study has some limitations that warrant consideration. First, the retrospective nature of the study design may introduce bias and limit the accuracy of data collection. Second, the sample size of 58 patients is relatively small, which may limit the generalizability of the study findings. Third, we agree that all other maneuvers used can affect the final result, and their effectiveness is reported in the literature; however, we added these measures to see whether this technique affects our rhinoplasty outcome positively or not. Additionally, the study was conducted at a single center, which may limit the generalizability of the results. Finally, the study did not include a control group, which limits the ability to compare the outcomes of the bilateral SEG to other surgical techniques. Despite these limitations, this study provided valuable insights into the surgical outcomes of the novel bilateral SEG technique in septorhinoplasty

and contributed to the growing body of literature on this topic. Further studies with larger sample sizes, longer follow-up periods, and control groups are needed to confirm and expand upon these findings.

## CONCLUSIONS

In conclusion, bilateral SEG in septorhinoplasty has demonstrated promising results in improving both functional and aesthetic outcomes. The results of this retrospective study showed high patient satisfaction rates and a low incidence of postoperative complications. Further studies with larger sample sizes and longer follow-up periods are needed to confirm the efficacy and safety of this technique.

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## DISCLOSURE

*The authors have no financial interest to declare in relation to the content of this article.*

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